REMARKS

Claim 136 has been amended. Claims 131 to 144 are pending and under consideration.

Support for the amendment to claim 136 is found in the specification, e.g., at page 43, lines 13 to 18. Thus the claims are fully supported by the specification and add no new matter.

Rejection Under 35 U.S.C. §102

The Examiner rejects claims 131 to 134 and 136 to 144 under 35 U.S.C. § 102(b) as allegedly being anticipated by Friedhoff et al. *Anal. Biochem.* 215:9 –16 (1993) ("Friedhoff"). *See* Action at pages 3 to 5, item 7. The Examiner's rejections of claims 131 to 134, claims 136 to 140, and claims 141 to 144 will be addressed separately.

Claims 131 to 134

The Examiner rejected claims 131 to 134 under 35 U.S.C. § 102(b) as allegedly being anticipated by Friedhoff. *See id.* The Examiner repeats certain allegations concerning Friedhoff then alleges that Friedhoff teaches the elements "...a plurality of different amplification products which have been amplified from a plurality of different loci..." because Friedhoff allegedly discusses "...two different amplification products, with either a AT or GC basepair at the SNP site...." *See id.* at pages 3 to 4, item 7. With regard to the single base pair difference between the two amplification products of Friedhoff, the Examiner alleges that under the broadest interpretation "...different loci represent any two sequences which are different. Under this interpretation, even a single base change would result in the sequence being a different loci." *See id.* at page

3, item 2. Thus, this broad interpretation of the term "loci" provides the basis for the Examiner's rejection. Applicant respectfully traverses.

"During patent examination, the pending claims must be 'given their broadest *reasonable* interpretation consistent with the specification.' *In re Hyatt,* 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000)." *See* MPEP § 2111 (emphasis added). "The broadest reasonable interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach. *In re Cortright,* 165 F.3d 1535, 1359, 49 USPQ2d 1464, 1468 (Fed. Cir. 1999)...." *See id.*

Here, the definition of locus chosen by the Examiner is inconsistent with the specification. Specifically, the specification states, "Figure 2 depicts a method for differentiating between two potential alleles in a target locus using certain embodiments of the invention." *See* the specification at page 11, lines 18 to 19. Thus, the locus depicted in Figure 2 comprises one of two possible alleles that differ by one nucleotide. According to the Examiner's definition, each of those alleles should correspond to a different locus. However, the two alleles correspond to a single locus. Thus, the Examiner's definition of "locus" is clearly inconsistent with the description of Figure 2.

Additionally, the Examiner's interpretation of "locus" is not reasonable in view of the interpretation of those skilled in the art. Specifically, the Examiner's definition of "locus" is inconsistent with the definitions of locus in the art. For example, the *Dictionary of Science and Technology* defines "locus" as follows: "*Science.* the particular site of something; a location. *Genetics.* the site on a chromosome where a particular gene is normally located." *See* the *Dictionary of Science and Technology* 1264 (Christopher Morris ed., Academic Press 1992). A copy of page 1264 of the

Dictionary of Science and Technology is attached. Similarly, the textbook, *Genetics: Human Aspects* states, "[t]he particular site or location where a gene is found along the length of a chromosome is the **locus** of that gene." *See* Arthur P Mange & Elaine Johansen Mange, *Genetics: Human Aspects* 15 (Sinauer Associates 2nd ed. 1990)(emphasis in original). A copy of page 15 from *Genetics: Human Aspects* is attached. Finally, the textbook, *Genetic Analysis of Animal Development* defines locus as "[t]he position of a gene on a chromosome; the gene itself." *See* Adam S. Wilkins, *Genetic Analysis of Animal Development* 482 (Wiley Liss 2nd ed. 1993). A copy of page 482 from *Genetic Analysis of Animal Development* is attached. The Examiner's definition of "locus" is inconsistent with those definitions. Therefore, the Examiner's definition is not reasonable in view of the definitions in the art.

Consequently, the two amplification products of Friedhoff, which differ by a single nucleotide, are not different loci. Therefore, applicant asserts that Friedhoff would not have shown or suggested "...a plurality of different amplification products which have been amplified from a plurality of different loci...."

For at least these reasons, the Examiner has failed to establish that Friedhoff discloses each and every element of claim 131, and claims 132 to 134, which depend from claim 131. Thus, applicant need not address the Examiner's contentions concerning other elements of those claims. By not addressing those contentions, applicant in no way acquiesces to those contentions.

Applicant requests reconsideration and withdrawal of the 35 U.S.C. § 102(b) rejection of claims 131 to 134 over Friedhoff.

Claims 136 to 140

The Examiner rejected claims 136 to 140 under 35 U.S.C. § 102(b) as allegedly being anticipated by Friedhoff. *See* Action at pages 3 to 5, item 7. The Examiner repeats certain allegations concerning Friedhoff then alleges that "[w]ith regard to claims 136 and 140, these claims [require] that the sequence specific mobility modifiers do not cross hybridize to the same addressable support specific portion. Since hybridization specificity depends upon conditions and since conditions can be designed which distinguish oligonucleotides which differ from a single nucleotide, the oligonucleotides of Friedhoff can be analyzed under conditions where they will not cross hybridize." *See id.* at page 5. Applicant respectfully traverses.

Applicant asserts that the Examiner's has reached a conclusion that is not supported by the allegations that the Examiner makes. Here, the Examiner alleges that one can select conditions wherein oligonucleotides that differ by a single nucleotide can be distinguished. The Examiner then concludes that because one can select conditions wherein those different oligonucleotides can be distinguished, then those different oligonucleotides will not cross-hybridize under those conditions. But that conclusion does not follow from the Examiner's allegation concerning distinguishing oligonucleotides. To distinguish oligonucleotides that differ by a single nucleotide, one can select conditions wherein one oligonucleotide binds to a sequence with more affinity than a second nucleotide. Said another way, both oligonucleotides bind to the sequence, but one oligonucleotide binds with more affinity than the other, and thus, is bound more frequently than the other. However, cross-hybridization between the oligonucleotides would nonetheless be expected to occur under the selected conditions.

Therefore, those conditions do not necessarily equate to conditions wherein the two oligonucleotides of Friedhoff, which differ by a single nucleotide, "...do not cross-hybridize to the same addressable support-specific portion."

Indeed, the point of the oligonucleotide ligation assay in Friedhoff is to increase the specificity of the detection of the single nucleotide change. For example, Friedhoff states, "[d]iscrimination between amplified sample and control DNA must then be done after PCR, for example, as it is done here by an oligodeoxynucleotide ligation assay (OLA) which allows discrimination between DNA molecules that differ by a point mutation." *See* Friedhoff at page 10, col. 1. If conditions existed, such as the Examiner suggests, wherein the two oligonucleotides of Friedhoff do not cross-hybridize, there would be no need for the extra selection step of the oligonucleotide ligation assay. In fact, Friedhoff itself suggests that those conditions do not exist. For example, even after optimization of hybridization and ligation conditions, and with the extra selection step of an oligonucleotide ligation assay, Friedhoff only achieved specificity of ">95%." *See id.* at page 15, col. 1. Thus, even under optimized conditions, Friedhoff still detected mishybridization and misligation of oligonucleotides.

If the Examiner is aware of a reference that shows conditions wherein oligonucleotides that differ by a single nucleotide do not cross-hybridize, applicant requests that he cite that reference. Otherwise, applicant requests that the Examiner withdraw the rejection.

Thus, applicant asserts that the Examiner has failed to establish that Friedhoff would have failed to show or suggest the elements "...wherein the tag complements of at least two different sequence-specific mobility modifiers of the at least two different

sequence-specific mobility-modifiers do not cross-hybridize to the same addressable support-specific portion."

For at least these reasons, the Examiner has failed to establish that Friedhoff discloses each and every element of claim 136, and claims 137 to 140, which depend from claim 136. Thus, applicant need not address the Examiner's contentions concerning other elements of those claims. By not addressing those contentions, applicant in no way acquiesces to those contentions.

Applicant requests reconsideration and withdrawal of the 35 U.S.C. § 102(b) rejection of claims 136 to 140 over Friedhoff.

Claims 141 to 144

The Examiner also rejected claims 141 to 144 under 35 U.S.C. § 102(b) as allegedly being anticipated by Friedhoff. *See* Action at pages 3 to 5, item 7. The Examiner repeats certain allegations concerning Friedhoff, however, the Examiner never addresses the language "...wherein the addressable-support specific portion does not comprise any portion of the target specific portion." *See id.* Applicant respectfully traverses.

In this case, the Examiner has not shown that Friedhoff would have taught or suggested all of the elements of claim 141. Specifically, the Examiner has not shown that Friedhoff would have shown or suggested the elements "...wherein the addressable-support specific portion does not comprise any portion of the target specific portion." That language appears in claim 141. Furthermore, applicant asserts that Friedhoff does not teach those elements of claim 141.

For at least these reasons, the Examiner has failed to establish that Friedhoff discloses each and every element of claim 141, and claims 142 to 144, which depend from claim 141. Thus, applicant need not address the Examiner's contentions concerning other limitations of those claims. By not addressing those contentions, applicant in no way acquiesces to those contentions.

Applicant requests reconsideration and withdrawal of the 35 U.S.C. § 102(b) rejection of claims 141 to 144 over Friedhoff.

Rejection Under 35 U.S.C. §103

The Examiner rejected claims 131 to 144 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Jenkins et al., *APMIS* 99: 667-673 (1991)("Jenkins") in view of U.S. Patent No. 5,514,543 ("Grossman"). *See* Action at pages 6 to 9, item 10. The Examiner's rejections of claims 131 to 135, claims 136 to 140, and claims 141 to 144 will be addressed separately.

Claims 131 to 135

The Examiner rejected claims 131 to 135 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Jenkins in view of Grossman. *See* Action at pages 6 to 9, item 10. Specifically, the Examiner makes certain allegations concerning Jenkins and Grossman, and then alleges that Jenkins teaches "a plurality of different amplification products drawn to different loci...." *See id.* at page 6. Applicant respectfully traverses.

As applicant discussed above, the term locus, as used in the art refers to a particular site or location on a chromosome. Figure 1 of Jenkins shows "[a]ligned sequences of the amplified regions of HPV types 6, 11, 16, 18 and 33." *See* Jenkins at

page 668, Figure 1. Thus, Jenkins shows amplification products from different HPV types, but each amplification product is from the same location within an HPV genome. Thus, Jenkins only shows one locus. Consequently, Jenkins does not teach "...a plurality of different amplification products which have been amplified from a plurality of different loci...." Grossman would have failed to remedy those deficiencies of Jenkins.

Accordingly, the Examiner has failed to establish that the combination of Jenkins and Grossman would have rendered obvious claim 131. Claims 132 to 135 depend from claim 131. Thus, for the reasons discussed above for claim 131, the Examiner fails to establish that claims 132 to 135 would have been obvious over Jenkins in view of Grossman. Because the Examiner fails to establish that claims 131 to 135 would have been obvious for at least the reasons discussed above, applicant need not address the Examiner's contentions concerning other elements of those claims. By not addressing those contentions, applicant in no way acquiesces to those contentions.

Applicant respectfully requests reconsideration and withdrawal of the § 103(a) rejections of claims 131 to 135 over Jenkins in view of Grossman.

Claims 136 to 140

The Examiner also rejected claims 136 to 140 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Jenkins in view of Grossman. *See* Action at pages 6 to 9, item 10. Solely to expedite prosecution, and without acquiescing to the Examiner's rejection, applicant has amended claim 136 to include the language "...wherein at least two different amplification products of the plurality of different amplification products were amplified from different target nucleic acid sequences derived from the same individual genome...." Furthermore, applicant asserts that Jenkins would not have

shown or suggested "...wherein at least two different amplification products of the plurality of different amplification products were amplified from different target nucleic acid sequences derived from the same individual genome...." Rather, each amplification product of Jenkins is from a separate genome. *See* Jenkins at page 668, Figure 1. Thus, Jenkins would not have taught or suggested claim 136. Grossman does not remedy that deficiency of Jenkins.

Accordingly, the combination of Jenkins and Grossman would not have rendered obvious claim 136. Claims 137 to 140 depend from claim 136. Thus, for the reasons discussed above for claim 136, Jenkins and Grossman would not have rendered obvious claims 137 to 140. Because the combination of Jenkins and Grossman would not have rendered obvious claims 136 to 140 for at least the reasons discussed above, applicant need not address the Examiner's contentions concerning other elements of those claims. By not addressing those contentions, applicant in no way acquiesces to those contentions.

Applicant respectfully requests reconsideration and withdrawal of the § 103(a) rejections of claims 136 to 140 over Jenkins in view of Grossman.

Claims 141 to 144

The Examiner also rejected claims 141 to 144 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Jenkins in view of Grossman. *See* Action at pages 6 to 9, item 10. The Examiner repeats certain allegations concerning Jenkins and Grossman, however, the Examiner never addresses the language "...wherein the addressable-support specific portion does not comprise any portion of the target specific portion." *See* Action at pages 3 to 5, item 7. Applicant respectfully traverses.

In this case, the Examiner has not shown that Jenkins in view of Grossman would have taught or suggested all of the elements of claim 141. Specifically, the Examiner has not shown that Friedhoff would have shown or suggested the elements "...wherein the addressable-support specific portion does not comprise any portion of the target specific portion." That language appears in claim 141. Furthermore, applicant asserts that Jenkins in view of Grossman would not have taught or suggested those elements.

Accordingly, the Examiner has failed to establish that the combination of Jenkins and Grossman would have rendered obvious claim 141. Claims 142 to 144 depend from claim 141. Thus, for the reasons discussed above for claim 141, the Examiner fails to establish that claims 142 to 144 would have been obvious over Jenkins in view of Grossman. Because the Examiner fails to establish that claims 141 to 144 would have been obvious for at least the reasons discussed above, applicant need not address the Examiner's contentions concerning other elements of those claims. By not addressing those contentions, applicant in no way acquiesces to those contentions.

Applicant respectfully requests reconsideration and withdrawal of the § 103(a) rejections of claims 141 to 144 over Jenkins in view of Grossman.

Conclusion

Applicant respectfully asserts that the application is in condition for allowance and requests issuance of a Notice of Allowance. If the Examiner does not consider the application to be in condition for allowance, applicant requests that he call the undersigned at (650) 849-6658 to set up an interview.

Please grant any extensions of time required to enter this response and charge any additional required fees to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: August 1, 2005

By: _____

Michael R. Albrecht
Reg. No. 54,956
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locomotive boiler *Mechanical Engineering.* an internally fixed horizontal fire-tube boiler integrated with a furnace, used on steam locomotives.

locomotive crane *Mechanical Engineering.* a steam-powered crane mounted on a flatbed railroad car or on a special chassis with flange wheels.

locomotive gradient *Mining Engineering.* the incline set by law for a locomotive haulage; while the maximum limit is 1 in 15, for practical purposes it is 1 in 25.

locomotive haulage *Mining Engineering.* any coal ore, workers, and materials that are transported by locomotive-hauled mine cars.

locomotor *Physiology.* **1.** of or relating to locomotion. **2.** relating to or affecting the locomotive apparatus of the body.

locomotor ataxia see TABES DORSALIS.

locomotor system *Zoology.* physical parts and processes that enable an organism to move independently from one place to another.

loco weed or **locoweed** *Botany.* any selenium-containing legume of the genera *Astragalus* and *Oxytropis,* which poison domestic animals.

loctal base see LOKTAL BASE.

loculate *Biology.* divided into compartments, chambers, or cavities, such as an ovary, anther, or fruit.

locule *Botany.* a small chamber, cavity, or compartment in a plant in which specialized structures may grow, such as an ovary. Also, **loculus.**

loculicidal *Botany.* of or relating to a type of dehiscence in which the locule is bisected.

Loculoanoteromycetidae *Mycology.* a subclass of fungi belonging to the class Loculoascomycetes which are characterized by ascocarps that are determinate in size and generally round or oval; it is composed of plant parasites or members which live off of nonliving organic matter.

Loculoascomycetes *Mycology.* a class of fungi belonging to the subdivision Ascomycotina which are characterized by an ascocarp that is formed by cell division or by the interweaving of the hyphae of vegetative mycelium.

Loculoedaphomycetidae *Mycology.* a subclass of fungi belonging to the class Loculoascomycetes which are characterized by ascocarps that are determinate in size and of various shapes.

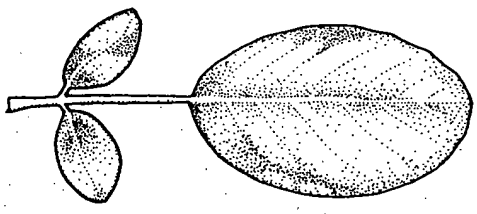
Loculoparenchemycetidae *Mycology.* a subclass of fungi belonging to the class Loculoascomycetes which are characterized by ascocarps that are determinate in growth, form a layer, and are generally asymmetric.

Loculoplectascomycetidae *Mycology.* a subclass of fungi belonging to the class Loculoascomycetes which primarily occur on decaying organic matter in tropical regions, although some members are parasitic to plants.

locus *Science.* the particular site of something; a location. *Genetics.* the site on a chromosome where a particular gene is normally located. *Mathematics.* the set of points or values satisfying a given equation or set of conditions.

locus of control *Psychology.* an individual's sense of the extent to which the events in his or her life are under his or her internal control, rather than the result of external causes.

locust *Invertebrate Zoology.* any of various grasshoppers of the family Locustidae, noted since ancient times for traveling in huge swarms and causing extensive destruction of agricultural crops. *Botany.* any of various North American trees of the genus *Robinia,* especially the **black locust,** *R. pseudodacacia,* which has pinnate leaves and clusters of white flowers. *Materials.* the wood of such a tree, widely used in construction and in industry.



locust

Locustidae *Invertebrate Zoology.* a family of migratory, short-horned grasshoppers, serious pests that swarm in vast numbers and strip large areas of vegetation.

Lodderomyces *Mycology.* a genus of yeast fungi belonging to the family Saccharomycetaceae; only one species, *L. elongisporus,* is found in soil and fruit juice.

lode *Geology.* **1.** in general, any mineral deposit occurring within consolidated rock. **2.** specifically, a body of ore that has commercial value; often used in the names of specific sites; e.g., the Comstock Lode.

lode claim *Mining Engineering.* the legal acquisition of a particular vein or lode, and of the adjoining surface.

lodestar *Astronomy.* any star that serves as a guide to navigation, especially the North Star (Polaris). (From an earlier use of *lode* meaning "to guide.")

lodestone *Mineralogy.* a naturally occurring magnetic iron oxide, (Fe_3O_4, the mineral magnetite), exhibiting polarity. Also, HERCULES STONE, LEADING STONE.

lodgepole pine *Botany.* a tall pine tree of western North America, *Pinus contorta,* having short needles and twisted, usually closed cones. (From its use as timber.)

lodging *Plant Pathology.* an abnormal condition of cereal plants, in which they collapse before being harvested due to lack of light, nitrogen or moisture excess, frost injury, parasite attack, or breaking due to weather (such as wind).

lodicule *Botany.* a minute scale at the base of the ovaries of certain grasses.

lodos *Meteorology.* a southerly wind that occurs on the Black Sea coast of Bulgaria.

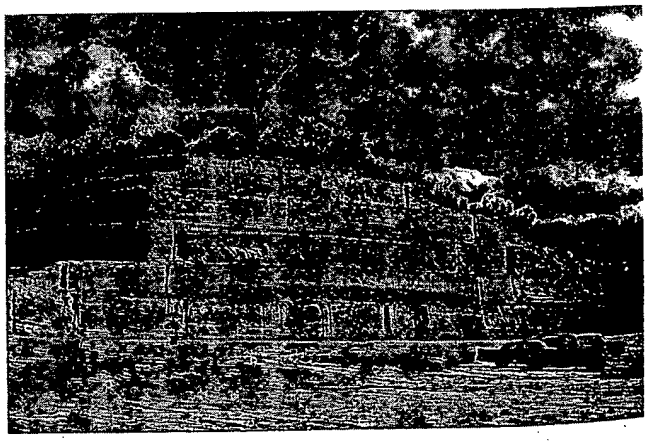
lodranite *Geology.* a stony, iron-bearing meteorite that is composed of bronzite and olivine, and enclosed in a fine network of nickel-iron.

lod score *Genetics.* in an experiment, a quantity indicating the statistical significance of a departure of the actual results from the expected results; a logarithmic value of the odds of the departure being due only to chance.

Loeb, Jacques 1859–1924, American physiologist; pioneer in chemical physiology and zoology; developed artificial fertilization.

loellingite see LÖLLINGITE.

loess [les; lō´əs] *Geology.* an extremely fertile, fine-grained loam composed of quartz, feldspar, horneblende, mica, and clay; deposited by the wind during the Pleistocene Age. It originates in arid regions from glacial outwash. It is normally yellowish-brown and has a widely varied calcium-carbonate content. (Going back to a German word meaning "loose.")



loess

loess kindchen *Geology.* a concretion of calcium carbonate occurring in loess whose shape somewhat resembles a child's head.

loeweite see LÖWEITE.

Loewi, Otto [lē´vē; lō´ē] 1873–1961, German pharmacologist; awarded the Nobel Prize for his discoveries regarding the chemical transmission of nerve impulses.

Löffler, Friedrich [lef´lər] 1852–1915, German bacteriologist; discovered the causes of diphtheria (with Klebs) and of foot-and-mouth disease (with P. Frosch).

Löffler's serum *Microbiology.* a solid nutrient medium typically used to make slope cultures of bacterial species such as *Coryneform diphtheriae,* and composed of blood serum, nutrient broth, and glucose.

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which of the two sorts of pollen will become united with each separate egg cell. According, however, to the law of probability, it will always happen, on the average of many cases, that each pollen form, *A* and *a*, will unite equally often with each egg cell form, *A* and *a*" (Mendel 1865).

The four equally likely combinations are as follows:

	Type of egg cell		Type of pollen grain		Type of seed and plant	
1/4	*A*	×	*A*	→	*A/A*	3/4 tall
1/4	*A*	×	*a*	→	*A/a* (1/2 *A/a*)	3/4 tall
1/4	*a*	×	*A*	→	*a/A* (1/2 *A/a*)	3/4 tall
1/4	*a*	×	*a*	→	*a/a*	1/4 short

Hence the recovery, in the F_2 generation, of 1/4 *A/A* : 1/2 *A/a* : 1/4 *a/a* plants. Since the tall trait is dominant, however, it is impossible to distinguish the *A/A* plants from the *A/a* plants just by looking at them. What one sees is 3/4 tall plants and 1/4 short plants.

Modern Nomenclature

Several terms were coined after Mendel's time to describe these situations. The factors *A* and *a* are **alleles** of each other; they are alternative forms of a **gene** that influences plant height. We can thus refer to *A* as the dominant allele of the gene determining plant height, and to *a* as its recessive allele. The terms *gene* and *allele* are sometimes used interchangeably, but in most contexts only one term is correct. It is proper to say that we are discussing the gene (not the allele) for plant height that exists chemically in different allelic forms, one form determining taller growth than the other. (Most genes, by the way, exist in more than two allelic forms, but a given individual carries only two alleles.) In later chapters we discuss the nature of the chemical differences between alleles of a particular gene and how they cause the differences that are observed.

Genotype refers to the precise allelic composition of a cell, such as *A/A* or *A/a* or *a/a*. **Phenotype** refers to what is actually observed in an organism, that is, tall plants or short plants. The phenotype *short* is due to the genotype *a/a*. The phenotype *tall* is due to either the genotype *A/A* or the genotype *A/a*. A **homozygous** genotype is one in which the two alleles are the same (*A/A* or *a/a*); in a **heterozygous** genotype, the two alleles are different (*A/a*). When we are not sure whether a phenotypically tall plant is genotypically homozygous (*A/A*) or heterozygous (*A/a*), we write the genotype *A/−*, the dash representing an allele that could be either *A* or *a*. The designation *A/−* can also be used when we are not interested in distinguishing between the dominant homozygote and the heterozygote.

Genes are present on **chromosomes** inside the nucleus of a cell in higher organisms (Chapter 4). Mendel was unaware of the existence of chromosomes. But just as Mendelian factors (alleles) are paired, so too are chromosomes. The two members of a pair of corresponding chromosomes are known as **homologues**. In fact, the two alleles of the same gene occupy the same relative position on homologous chromosomes. The particular site or location where a gene is found along the length of a chromosome is the **locus** of that gene. For example, in a heterozygous tall plant, *A/a*, the allele *A* occupies a particular locus on a particular chromosome. At a corresponding position on the homologous chromosome is found its allele, *a*. In humans, and in many other organisms with separate sexes (unlike peas), all homologous pairs of chromosomes are called **autosomes**, except for one pair called **sex chromosomes.**

A Checkerboard Method for Predicting Offspring

This procedure, although somewhat cumbersome, helps students to visualize simple crosses involving just one or two gene loci. (Better techniques of problem solving, using the rules of probability, will be presented in Chapter 10.) The steps for this method (see Figure 3) are as follows:

1. Label the rows of a checkerboard with the various kinds of eggs that the female parent can make. There should be one row for each *different* kind of egg. The labeling of rows should include, in addition, the fraction represented by each egg type—what we call the *gamete fraction*—and these egg gamete fractions should together add up to 1. If the total is more than 1, it is likely that an egg type has been written down more than once.
2. Label the columns of the checkerboard in a similar fashion with the different kinds of male gametes. Include the gamete fractions of each different kind. If the number of kinds of pollen or sperm is different from the number of kinds of eggs, you will end up with a rectangle rather than a square.
3. Fill in the body of the checkerboard with the *offspring genotypes* by combining the headings of the corresponding row and column. The fraction of each offspring genotype is the *product* of the fractions heading the corresponding row and column (see also Chapters 10 and 11). In Figure 3, for example, 1/2 *A* × 1/2 *A* gives 1/4 *A/A* for the upper left-hand space.

Summing the two identical genotypes on the ascending diagonal squares (lower left + upper right) gives a total of 2/4 *A/a*. Phenotypically, *A/A* and *A/a* are tall (3/4), and *a/a* is short (1/4). In this checkerboard the egg

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eukaryotic transcriptional regulators and similar to the DNA binding regions of certain prokaryotic transcriptional regulator molecules.

homeotic mutation: A mutation causing the replacement of one part of an individual by a recognizable structure or region that normally develops in a different location.

homozygote: A diploid individual carrying two identical alleles of a gene.

hypomorph: A mutant gene producing reduced, but not nil, gene activity.

intron: A transcribed portion of a eukaryotic gene that is excised by the RNA processing machinery and which is, therefore, not found in the mature mRNA.

inversion: A chromosome rearrangement in which a section has been turned through 180°, to give a reversal of gene order in that section.

linkage: An association in gene inheritance such that parental allele combinations tend to be inherited.

locus: The position of a gene on a chromosome; the gene itself.

maternal effect gene: A gene expressed in oogenesis, capable of mutating to give a maternal effect in the progeny.

maternal effect mutation: A mutation whose expression in the female gamete-producing parent creates an effect, usually deleterious, in the progeny regardless of the progeny's genotype.

meiosis: The two successive nuclear divisions that accompany gamete formation in diploid organisms and which reduce the diploid state in gamete precursor cells to the haploid state in gametes.

messenger RNA (mRNA): The complementary RNA copy of a protein-coding gene.

mid-repetitive sequence: A sequence present in multiple copies, often slightly different from one another, in the genome of a eukaryote. A typical mid-repetitive sequence is present in several hundred copies.

mitotic recombination: The form of genetic recombination that takes place in diploid somatic cells, which can yield homozygous daughter cell progeny.

mosaic: 1. (noun) An individual composed of cells of different genotypes, though all derived initially from a single genotype zygote. 2. (adj.) In classical embryological literature, a type of egg whose territories possess specific capacities for specifying particular parts of the embryo. 3. (adj.) In more recent literature, may refer to an embryo whose different cellular regions develop independently of one another.

mutant: An individual manifesting the expression of an altered gene. Also (adj.) the state of bearing a mutation, referring either to a gene or to an individual.

mutation: 1. The process by which a gene undergoes a transmissible alteration. 2. The hereditary alteration in the gene itself.

Genetic Analysis of Animal Development

Second Edition

Adam S. Wilkins

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